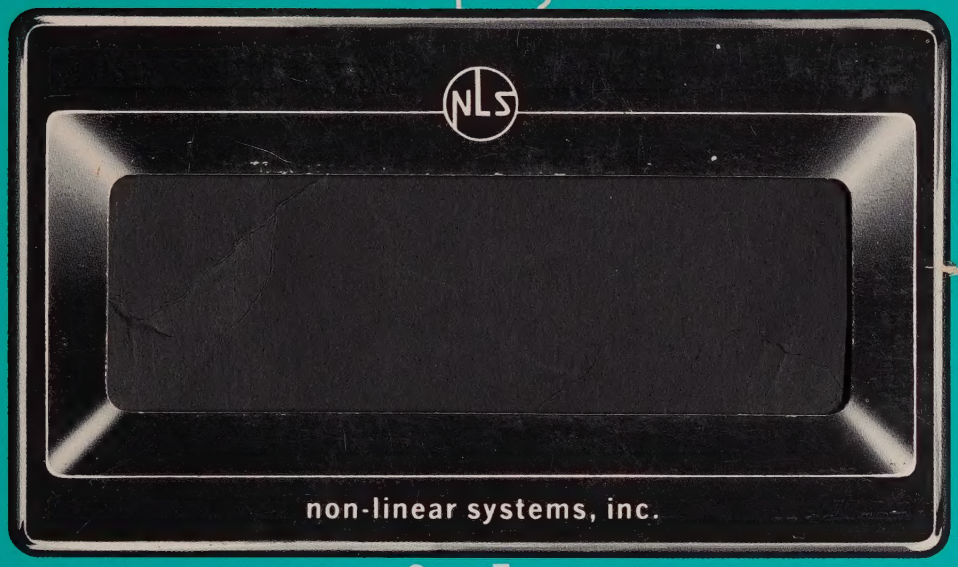

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DEL MAR, CALIFORNIA

Document No. 934A
Revised March 1968

OPERATION AND CALIBRATION INSTRUCTIONS
SERIES X-3
DIGITAL VOLTMETER

This Document applies to Series X-3 DVM
bearing P/N 38-3 (S/N X-3-306 & Subsequent)

GENERAL ELECTRIC CO.
Instrumentation & Control
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NON-LINEAR SYSTEMS, INC.
Del Mar, California

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SERIAL NO. OF INSTRUMENT _____

SERIAL NO. OF AC CABLE _____

INFO
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714-755-1134

TABLE OF CONTENTS

Chapter	Title	Page
I	INTRODUCTION AND SPECIFICATIONS	1-1
II	OPERATING INSTRUCTIONS	2-1
	Unpacking	2-1
	Power Source	2-1
	Fusing	2-1
	Power Grounding	2-1
	Connectors	2-1
	Cables	2-2
	Controls	2-2
	Function Switch	2-2
	Range Switch	2-2
	On Display	2-2
	AC Zero	2-2
	DC & Ohms Zero	2-2
	Filter Switch	2-2
	Digital Readout	2-2
	Operation	2-4
	Zeroing The Readout	2-4
	MVDC or VDC Zero	2-4
	Current Zero	2-4
	Ohms Zero	2-4
	AC Zero	2-4
	Filter Switch	2-4
	Cable Connections	2-4
	PS-1 Power Supply Operation	2-5
	Controls	2-5
	Monitor Switch	2-5
	Voltage Output	2-5
	Current Measurement	2-5
III	CALIBRATION INSTRUCTIONS	3-1
	Equipment Required	3-1
	Initial Preparation	3-1
	Procedure	3-1
	APPENDIX	A-1

LIST OF TABLES

Number	Title	Page
I	Measurement Capabilities	2-3

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LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	PS-1 Supply Regulated Output per Line Voltage	1-3
2-1	Power Plug Pin Coding	2-1
3-1	Left View	3-2
3-2	Right View	3-3
3-3	Main Board Assembly Test Points	3-4
3-4	MVDC and VDC Calibration	3-6
3-5	Current Calibration	3-7
3-6	Ohms Calibration	3-8
3-7	VAC Calibration	3-9

SCHEMATIC DIAGRAM

Final Assembly, DVM ..... 38-3, Sheet 2
PS-1 Power Supply ..... 38-80, Sheet 2

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CHAPTER I

INTRODUCTION AND SPECIFICATIONS

The Series X-3 Multipurpose Digital Voltmeter is a light weight, portable, three-digit instrument with automatic polarity and with provisions for 100% over-ranging in most ranges and functions (See specifications for exceptions).

The measuring capabilities of the Series X-3 DVM are widely varied, i.e. eight current ranges, three millivolt (DC) ranges, three VDC ranges, three VAC ranges and nine ohms ranges.

In addition to the digital readout, a unique feature of this instrument compared to conventional meter-type VTVM's and multimeters, analog output connectors are provided on the rear of the instrument.

Also, compared to conventional meters of this versatile nature, the Series X-3's circuitry is all solid state and its speed and accuracies are considerably higher.

A power supply plug-in unit (PS-1) is offered as an option to provide an adjustable regulated source of power for the engineer or laboratory technician to energize circuits for testing purposes during design phases. The Series X-3 may be used to monitor the output of the device under test while the PS-1 Supply is providing power.

SPECIFICATIONS

DC VOLTAGE

RANGE	OVER-RANGE	RESOLUTION	ACCURACY*
10 mV	19.99 mV	10 μV	0.2% Rdg. + 10 Digits
100 mV	199.9 mV	100 μV)	
1000 mV	1999. mV	1 mV)	
10 V	19.99 V	10 mV)	0.1% Rdg. + 1 Digit
100 V	199.9 V	100 mV)	
1000 V	999.9 V (Maximum)	1 V)	
10000 V (With Probe)		10 V	3% Rdg. + 2 Digits

DC CURRENT

10 nA	19.99 nA	10 pA	20% Rdg. + 10 Digits
100 nA	199.9 nA	100 pA	5% Rdg. + 10 Digits
1000 nA	1999. nA	1 nA	0.5% Rdg. + 10 Digits
10 μA	19.99 uA	10 nA	0.2% Rdg. + 1 Digit
100 μA	199.9 μA	100 nA)	
1000 μA	1999. μA	1 μA)	
10 mA	19.99 mA	10 μA)	0.1% Rdg. + 1 Digit
100 mA	199.9 mA (Maximum)	100 μA)	

* ASA Reference Conditions Only

SPECIFICATIONS (Cont'd)

OHMS

RANGE	OVER-RANGE		RESOLUTION	ACCURACY*
10Ω	19.99Ω	@10 mA	10 mΩ	0.1% Rdg. + 2 Digits
100Ω	199.9Ω	@1 mA	100 mΩ)	
1000Ω	1999Ω	@100 μA	1Ω)	0.1% Rdg. + 1 Digit
10 KΩ	19.99 KΩ	@10 μA	10Ω)	
100 kΩ	199.9 KΩ	@1 μA	100Ω)	
1000 KΩ	1999 KΩ	@100 nA	1 KΩ	0.5% Rdg. + 1 Digit
10 MegΩ	19.99 MegΩ	@100 nA	10 KΩ	1% Rdg. + 2 Digits
100 MegΩ	199.9 MegΩ	@10 nA	100 KΩ	20% Rdg. + 5 Digits
1000 MegΩ	1999 MegΩ	@1 nA	1 MegΩ	Usable for relative measurements

AC VOLTAGE

10 V	19.99 V	10 mV	3% F.S. (0.5 V & Up)**
100 V	199.9 V	100 mV	3% F.S. **
1000 V (300 V MAXIMUM)		1 V	3% F.S. **

POWER: 105-125 Volts, 20 Watts - 30 Watts with optional power supply loaded.

DIMENSIONS: 10-1/2" High, 7-3/8" Wide, 6" Deep.

WEIGHT: 10-1/2 lbs.

PS-1 POWER SUPPLY

OUTPUT: 0-20 VDC, 0-150 mA minimum. See Figure 1-1. (The specifications for regulation, ripple, noise, temperature coefficient and stability do not apply in the unregulated output areas).

LOAD REGULATION: Less than 10 mV for a full load to no load change in output current.

LINE REGULATION: Less than 1 mV change in output voltage for any line voltage change within rating of Series X-3 DVM (105 to 125 V RMS).

RIPPLE AND NOISE: Less than 500 μV peak-to-peak (DC to 10 K Hz).

TEMPERATURE RANGE: 10 to 43° C operating.

TEMPERATURE COEFFICIENT OF OUTPUT: Less than 0.02% plus 1 mV change per degree centigrade.

* ASA Reference Conditions Only
**@400 Hz

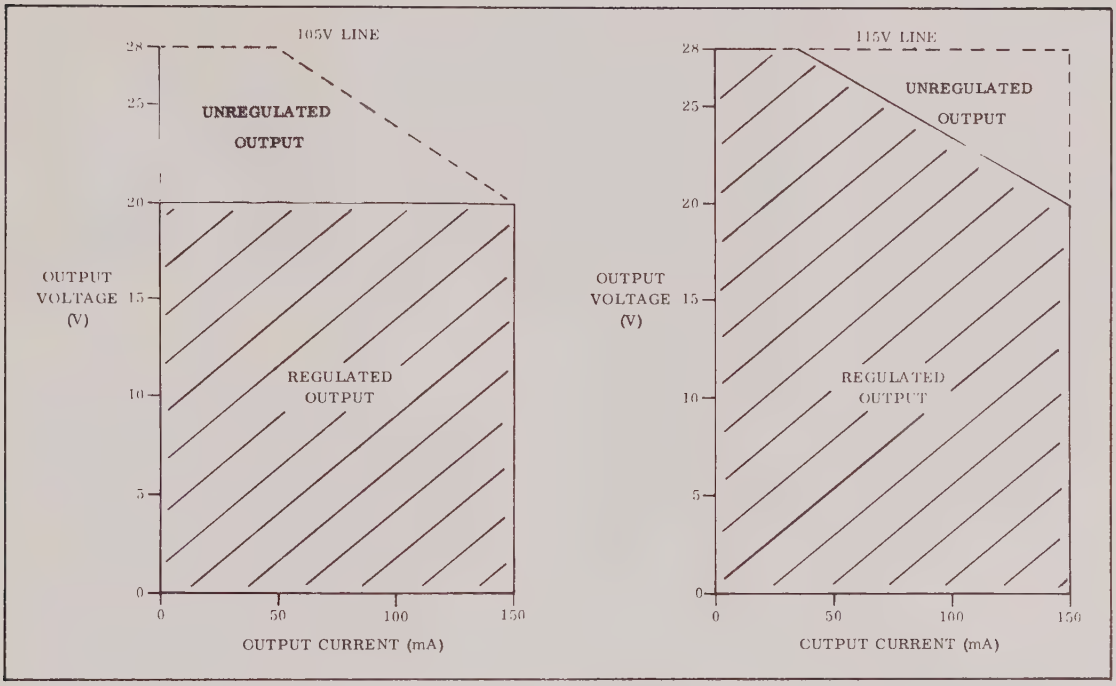


Figure 1-1. PS-1 Supply Regulated Output per Line Voltage

PS-1 POWER SUPPLY (Cont'd)

STABILITY: Less than 0.05% plus 5 mV total drift for 8 hours after an initial warm-up of one-half hour at constant ambient, constant line voltage and constant load.

OVERLOAD PROTECTION: Due to current limiting, the supply is short-circuit proof.

DIMENSIONS: 5" wide, 2-3/4" deep, 3" high.

CHAPTER II

OPERATING INSTRUCTIONS

UNPACKING

The instrument is shipped in a heavy cardboard container. Cut the tape on the top of the container and open. If damage is seen, promptly notify the carrier.

POWER SOURCE

The instrument is usually supplied for operation from 105-125 volt, 50-400 Hz, single phase power sources. However, the instrument will operate from 210-250 volt, 50-400 Hz, single phase sources if the two primaries of the power transformer are wired in series instead of in parallel. The serial number tag at the rear of the instrument indicates the correct power source if other than 105-125 volts or 50-400 Hz.

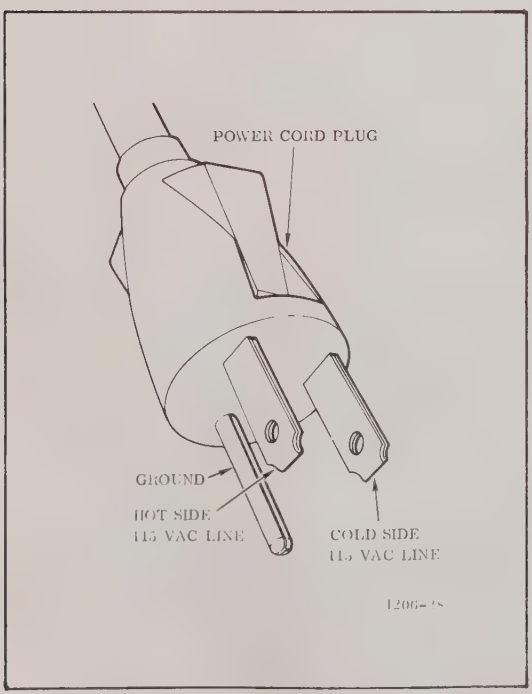


Figure 2-1. Power Plug Pin Coding

FUSING

The instrument is protected by a 3AG 3/8 ampere fuse (F1) which is located on the rear panel. When a 210-250 volt power source is to be used (and the power transformer primary rewired as indicated above), it is recommended that a 3/16 ampere fuse be used to provide maximum protection. An additional fuse (F2), also located in an extractor post on the rear panel, is provided to guard the ohms input circuit against any inadvertent application of voltage or current into the ohms input connector.

POWER GROUNDING

The third pin of the power plug grounds the outer chassis of the instrument (Figure 2-1). Despite the presence of the third grounding pin, there is no real assurance that the instrument will be correctly connected since the power outlets in many installations are erroneously wired. Be certain that the power source is in agreement with the power and grounding requirements of the instrument.

CONNECTORS

Eight input connectors are located on the front panel of the instrument; they are color-coded and labeled as to function:

AC PROBE – – – Phone Jack (no color)
OHMS — — — — Blue
CURRENT — — — Yellow
COM — — — — Black
VDC — — — — — Red
(None) — — — — Green (3)

NOTE

The green connectors are ONLY to be used for the insertion of the optional PS-1 Power Supply plugs.

Two connectors are located on the rear panel; they provide the analog output of the instrument (10 μA Maximum). The red connector is signal high; the black connector is signal low.

CABLES

Six cables are provided with each instrument; the part number, color and function of each are as follows:

15004-608-1	Yellow	Current
15004-608-2	Blue	Ohms
15004-608-3	Black	Common
15004-609	Red	VDC
38-50	Black with Silver Probe	AC Probe
38-75	Black with Red Probe	VDC High Voltage Probe

CONTROLS

FUNCTION SWITCH

The function switch is a nine-position switch, located on the front panel of the instrument. The position for each measurement function is appropriately labeled (See Table I).

RANGE SWITCH

The range switch is a three position switch, located on the front panel of the instrument. The positions for each range measurement are labeled L, M, and H (See Table I).

ON DISPLAY

The ON DISPLAY control, located on the front panel of the instrument, serves as a power switch and as a control to permit noisy input signals to be measured (turn clockwise). If input signals are not noisy, maximum reading speed can be obtained with this control turned counterclockwise (up to the position that would turn the power off). Compensate for noisy signals by rotating this control clockwise as required.

AC ZERO

The AC ZERO control, located on the front panel of the instrument, is provided to zero the readout prior to taking VAC readings.

DC & OHMS ZERO

The DC & OHMS ZERO control, located on the front panel of the instrument, is provided to zero the readout prior to taking current, MVDC, VDC or ohms readings.

FILTER SWITCH

The FILTER SWITCH is a two position toggle switch and is located on the front panel of the instrument. It is labeled IN and OUT and is provided to attenuate noisy input signals. In the higher resistance ranges, the filter may be switched out to obtain faster readings.

DIGITAL READOUT

The instrument is supplied with five readout tubes; polarity (+ or -) and overload (O_L) display; over-range (O) or (1) display; and three 0 thru 9 digital and decimal displays (left to right respectively). The O_L display will illuminate when the input reaches 100% over-range of each range limit for each measurement function.

Table I. Measurement Capabilities

FUNCTION SWITCH POSITION	RANGE SWITCH POSITION		
	L	M	H
nA	10 nA RANGE →	100 nA RANGE →	1000 nA RANGE
μA	10 μA RANGE →	100 μA RANGE →	1000 μA RANGE
mA	10 mA RANGE →	100 mA RANGE (200 mA Max.)	NON-OPERATING (Use with External Shunt Only)
MV	10 mVDC RANGE →	100 mVDC RANGE →	1000 mVDC RANGE
VDC	10 VDC RANGE →	100 VDC RANGE →	1000 VDC RANGE 1000 VDC MAX.
VDC	(10KV WITH PROBE)		
VAC	10 VAC RANGE (0.5V MIN) →	100 VAC RANGE →	1000 VAC RANGE 300 VAC MAX.
Ω	10 Ω RANGE →	100 Ω RANGE →	1000 Ω RANGE
KΩ	10 KΩ RANGE →	100 KΩ RANGE →	1000 KΩ RANGE
MEGΩ	10 MEGΩ RANGE →	100 MEGΩ RANGE →	1000 MEGΩ RANGE
100% OVER-RANGE ON ALL RANGES		EXCEPT 1000 VDC maximum; 10000 VDC with probe. 300 VAC maximum.	

NOTE: WHEN INSTRUMENT INDICATES 1999, RANGE/FUNCTION SWITCHES SHOULD BE ROTATED AS INDICATED BY ARROWS UNTIL A READING IS OBTAINED BETWEEN 0199 AND 1998. THIS WILL BE THE PROPER RANGE AND THE MOST ACCURATE READING OF WHICH THE INSTRUMENT IS CAPABLE WILL BE DISPLAYED.

OPERATION

1. Plug power cord into 115VAC, 50-400 Hz, single phase power source.
2. Turn ON DISPLAY control clockwise until an audible click is heard. Allow 30 minutes for instrument warm-up.
3. Place function switch in the position (as labeled) to obtain desired function to be measured (See Table I).
4. Place range switch in position to obtain desired range to be measured (Table I).

NOTE

To obtain accurate measurements within instrument's specified accuracies, it is essential that the readout of the instrument be brought to all zeros prior to operation and prior to measurement after EACH range OR function change.

ZEROING THE READOUT

MVDC or VDC Zero

1. Place function switch in mV or VDC position.
2. Plug red and black input cables into their matching-color connectors.
3. Connect leads of cables together and adjust DC & OHMS ZERO control until readout displays all zeros.

Current Zero

1. Place function switch in nA, μA or mA position.
2. Plug yellow and black input cables into their matching-color connectors.
3. With leads of cables open, adjust DC & OHMS ZERO control until readout displays all zeros. Because of noise pick-up, a more accurate zero may be obtained in the nA mode if the yellow lead is removed from the instrument.

Ohms Zero

1. Place function switch in Ω, KΩ, or MEGΩ position.
2. Plug blue and black input cables into their matching-color connectors.
3. Connect leads of cables together and adjust DC & OHMS ZERO control until readout displays all zeros.

AC Zero

1. Plug VAC cable into AC PROBE connector. Allow 5 minutes for warm-up.
2. Zero the instrument in VDC mode as set forth above.
3. Place function switch in VAC position.
4. Connect leads of cable together and adjust AC ZERO control until readout displays all zeros.

FILTER SWITCH

Place filter switch in the IN position for measurement of all low frequency signals.

CABLE CONNECTIONS

For signal measurement, connect instrument cables to signal source as shown in applicable calibration instructions (Figures 3-4 thru 3-7).

NOTE

Since the circuitry in the Series X-3 Digital Voltmeter is not connected to power ground, differential measurements above ground may be made. However, the signal to be measured, should first be analyzed to determine which terminal

has the lowest impedance to ground so that the black input lead of the X-3 may be connected to it.

PS-1 POWER SUPPLY OPERATION

CONTROLS

Monitor Switch

The Monitor switch is a three-position switch labeled: mA, VDC and SUPPLY. In the mA position (with the DVM function switch in the mA position), the DVM readout will display the current being drawn from the power supply output connectors. In the VDC position (with the DVM function switch in the VDC position), the DVM readout will display the voltage being supplied from the power supply output connectors. In the SUPPLY position, the power supply and the DVM are wholly independent, i.e. the power supply will provide output voltage and the DVM can be used to measure current, millivolts DC, Volts DC, Volts AC or ohms.

Voltage Output

1. Plug PS-1 Power Supply Unit into Series X-3 DVM.
2. Turn DVM on and allow 30 minutes for warm-up.
3. Place range switch in L position if desired voltage output is between 0V and 19.99 volts. Place range switch in M position if desired voltage output is in excess of 19.99 volts.
4. Place function switch in VDC position.
5. Zero the readout as set forth in DVM operation instructions.
6. Place voltage range selector switch on PS-1 unit in desired voltage range (0-10 volts or greater than 10 volts).
7. Place MONITOR switch on PS-1 in VDC position.
8. Adjust COARSE ADJUST and FINE ADJUST controls on PS-1 unit until desired output voltage is displayed in DVM readout.
9. Connect input leads of device or circuit to be tested into red connectors on PS-1 unit (they are labeled with plus minus symbols).
10. Place MONITOR switch on PS-1 unit in SUPPLY position. PS-1 unit is now supplying output voltage as previously set.
11. If it is desired to check the output of the device or circuit under test (AC, DC, MV or ohms), connect the appropriate input leads of the DVM to the output terminals of the device or circuit and operate the DVM in the normal manner.

CURRENT MEASUREMENT

To measure the current that the device or circuit under test is drawing:

1. Place DVM function switch in MA position.
2. Place MONITOR switch in PS-1 unit in mA position. The DVM readout will display the current drawn by the device or circuit under test.

CHAPTER III

CALIBRATION INSTRUCTIONS

EQUIPMENT REQUIRED

1. A voltage standard between 10 MVDC and 1000 VDC.
2. A current source between 10 nA and 150 mA.
3. An audio voltage standard between 10 VAC, 400 Hz and 300 VAC, 400 Hz.
4. An ohms standard betweeen 10 Ω and 15 MegΩ.
5. An oscilloscope, Tektronix Model 502, or equivalent.
6. A voltmeter capable of measuring 6.3 VDC.

INITIAL PREPARATION

1. Remove the four screws attaching the rear plate to top block and base block (two from each).
2. Gently withdraw chassis from rear of instrument's outer case.
3. Plug power cord inot 115VAC, 50-400 Hz, single phase power source.
4. Turn ON DISPLAY control clockwise until an audible click is heard. Allow 30 minutes for instrument warm-up.
5. In each step, as applicable in the following procedures, allow warm-up time for each item of test equipment as per manufacturers requirements.

PROCEDURE

1. Place ON DISPLAY potentiometer on front of instrument (right-most potentiometer) in center of its travel.
2. Place a voltmeter between 6.3V test point and Signal ground (Figure 3-1). Check to ensure that voltmeter indicates an input of 6.3 VDC ± 8%.
3. Place range switch of instrument in H position.
4. Place function switch of instrument in mV position.
5. Connect input cables to connectors on front of instrument as follows (connectors are labeled on front panel):

Red Cable	VDC
Black Cable	COM
Yellow Cable	CURRENT
Blue Cable	OHMS
Black Cable (with probe)	AC PROBE

6. Connect input leads of oscilloscope to ANALOG OUTPUT connectors on rear of instrument.
7. Set oscilloscope sensitivity to 1 MV/CM. Oscilloscope should not be isolated from earth ground.
8. Connect red and black (VDC and COM) input leads together.
9. Set R21 to Center of its travel and R19 and R20 fully counterclockwise (Figure 3-1).

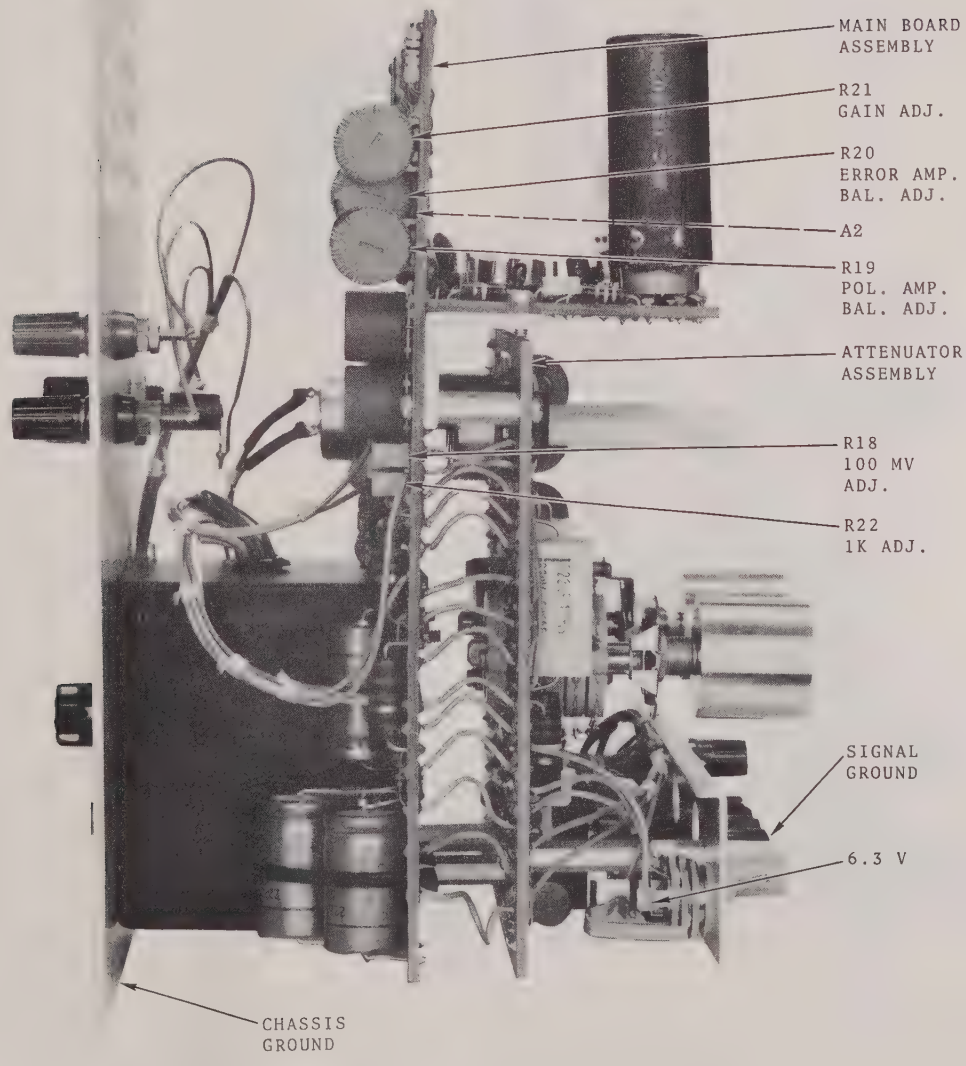


Figure 3-1. Left View

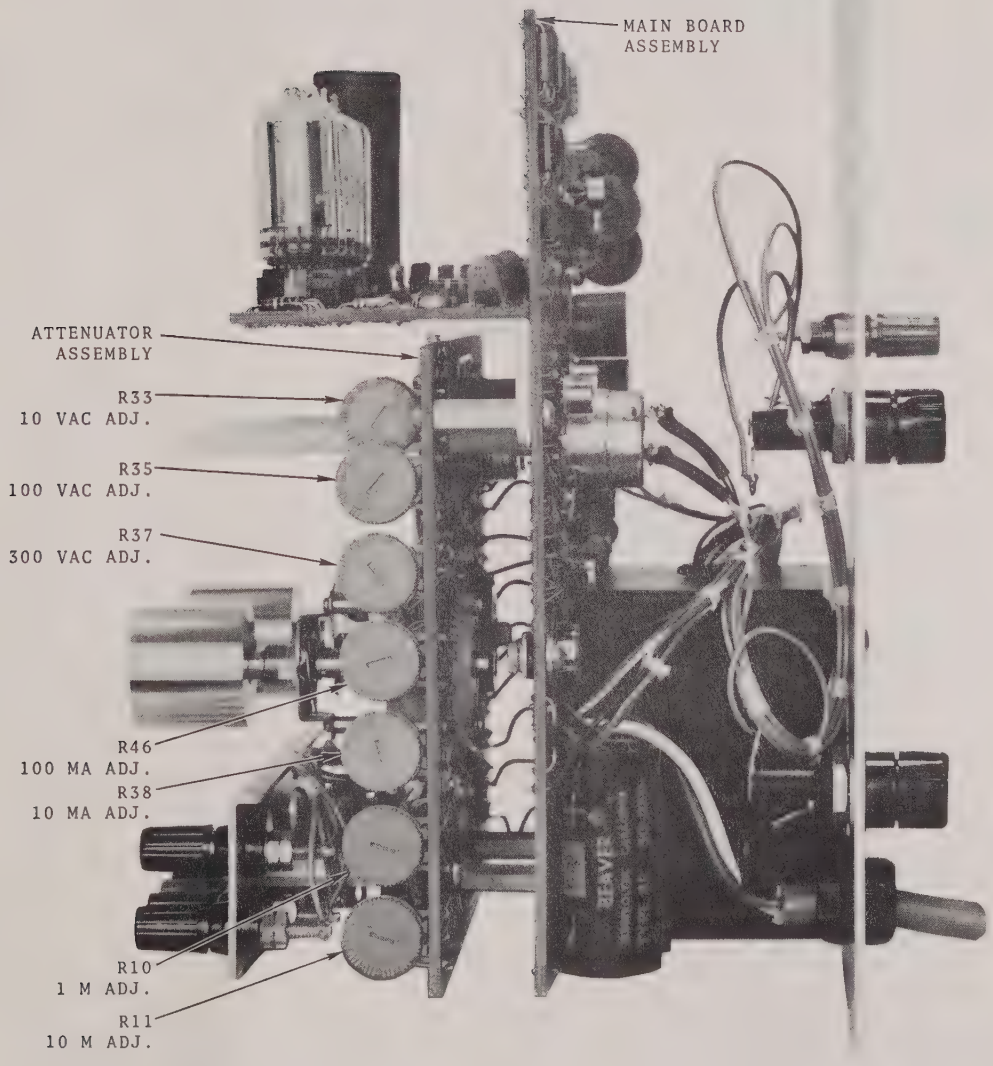


Figure 3-2. Right View

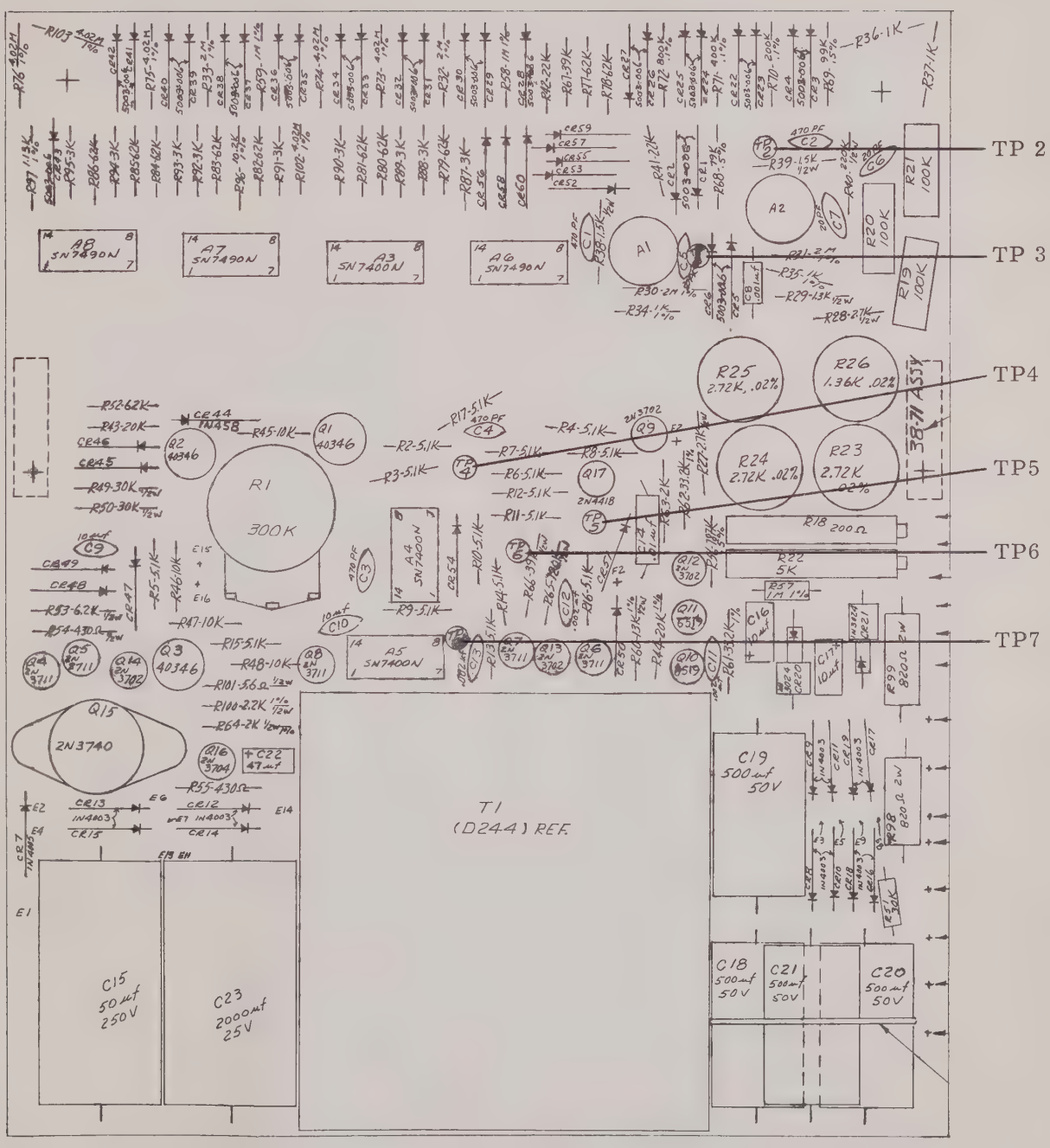


Figure 3-3. Main Board Assembly Test Points

10. Rotate DC and OHMS ZERO potentiometer on front of instrument (center potentiometer) until oscilloscope indicates a zero reading.

11. Connect input leads of oscilloscope to TP3 (Figure 3-3) and black analog output terminal.

12. Set oscilloscope sensitivity to 100 MV/CM.

13. Adjust R19 of Main Board Assembly (Figure 3-1) until oscilloscope shows a null indicated by a noise pattern of approximately 100 mV amplitude.

14. Adjust R20 of Main Board Assembly (Figure 3-1) until DVM readout just changes from +0001. to 0000.

15. Repeat steps 13 and 14 until both oscilloscope and DVM readout indicate a zero reading.

16. If rotating R20 causes a -0001. in the readout, R19 & R20 have been set too far clockwise; repeat steps 13 and 14.

17. Disconnect oscilloscope leads.

18. Adjust R21 of Main Board Assembly (Figure 3-1) until DVM counts down one digit at a time.

19. Connect red and black input leads to voltage standard. Apply approximately 150 mV.

20. Increase and decrease input voltage to see that DVM will count up one digit at a time to plus or minus 10 digits then count down one digit at a time and return to zero. If instrument does not, repeat steps 6 thru 20.

21. Connect red and black input leads together.

22. Adjust DC and OHMS ZERO potentiometer if necessary until readout displays all zeros.

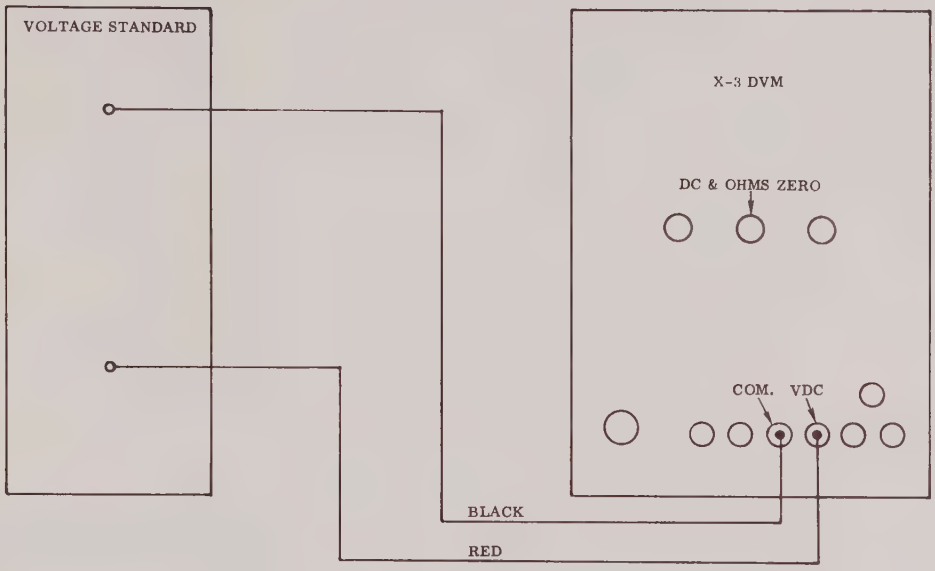
23. Place range switch in M position.

24. Connect red and black input leads to voltage standard. Apply approximately -150 MV.

25. Reverse polarity of signal input and check to see that the numerical value displayed in readout is identical (±2 digits), in either polarity, with the same voltage applied.

26. Instructions for range calibration in each mode of operation are contained in Figures 3-4 thru 3-7.

27. When calibration is complete, reassemble instrument in reverse order of disassembly. When inserting chassis into instrument's outer case, use care in guiding the control shafts into their respective holds in the front panel of the instrument.



NOTE

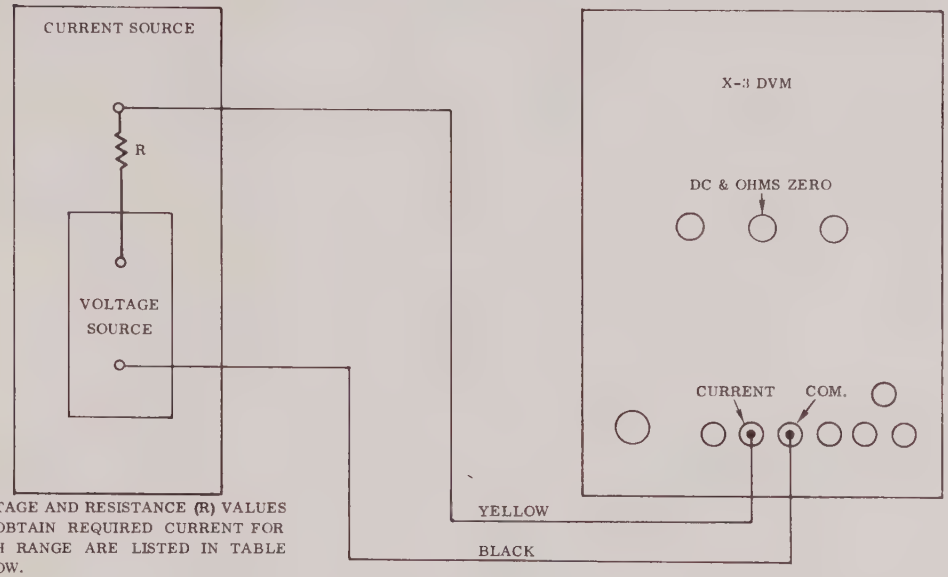
PRIOR TO EACH RANGE OR FUNCTION CHANGE, ZERO THE READOUT IN MVDC OR VDC MODE (REFER TO CHAPTER II, ZEROING THE READOUT MVDC or VDC Zero).

PROCEDURE

FUNCTION SWITCH POSITION	RANGE SWITCH POSITION	APPLY APPROXIMATELY	ADJUST	LOCATION* (Figure No.)	READOUT TO DISPLAY VOLTAGE APPLIED, WITHIN
mV	H	1500 mV	NONE	- - -	0.1% RDG + 1 DIGIT
mV	M	150 mV	R18	3-1(MB)	0.1% RDG + 1 DIGIT
mV	L	15 mV	NONE	- - -	0.2% RDG + 10 DIGITS
VDC	L	15 VDC WARNING HIGH VOLTAGE	NONE	- - -	0.1% RDG + 1 DIGIT
VDC	M	150 VDC	NONE	- - -	0.1% RDG + 1 DIGIT
VDC	H	950 VDC	NONE	- - -	0.1% RDG + 1 DIGIT

* MB = MAIN BOARD ASSEMBLY

Figure 3-4. MVDC and VDC Calibration



VOLTAGE AND RESISTANCE (R) VALUES TO OBTAIN REQUIRED CURRENT FOR EACH RANGE ARE LISTED IN TABLE BELOW.

NOTES

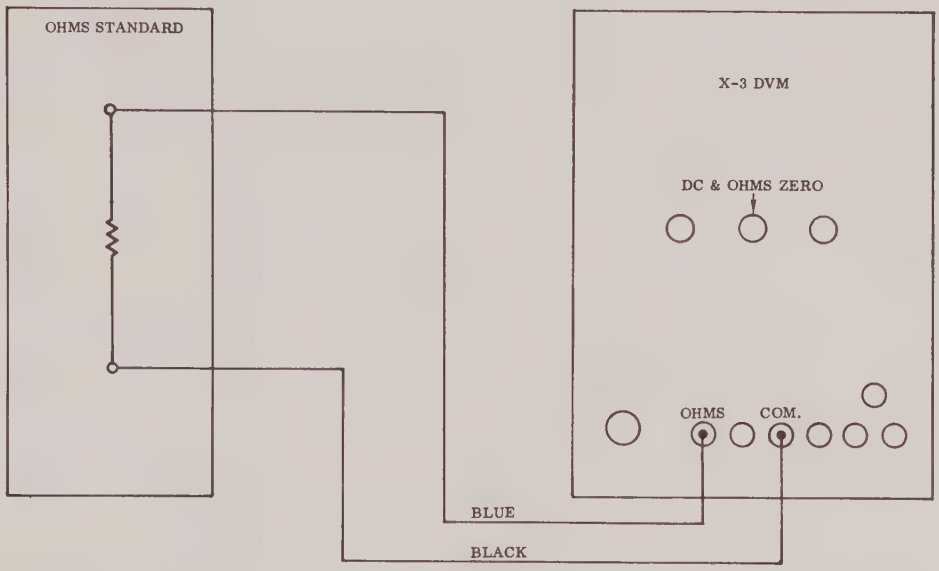
1. INSTRUMENT MUST FIRST BE CALIBRATED IN MVDC AND DC MODES.
2. PRIOR TO EACH RANGE OR FUNCTION CHANGE, ZERO THE READOUT IN THE CURRENT MODE (REFER TO CHAPTER II, ZEROING THE READOUT, Current Zero).

PROCEDURE

FUNCTION SWITCH POSITION	RANGE SWITCH POSITION	CURRENT TO BE APPLIED			ADJUST	LOCATION* (FIGURE NO.)	READOUT TO DISPLAY CURRENT APPLIED WITHIN	DVM INTERNAL RESISTANCE
			VOLTS (±0.02%)	R (±0.02%)				
nA	L	15 nA	0.165 V	10 M	NONE	---	20% RDG. + 10 DIGITS	1 MΩ
nA	M	150 nA	1.515 V	10 M	NONE	---	5% RDG. + 10 DIGITS	100 KΩ
nA	H	1500 nA	1.515 V	1 M	NONE	---	0.5% RDG. + 10 DIGITS	10 KΩ
μA	L	15 μA	15.150 V	1 M	NONE	---	0.2% RDG. + 1 DIGIT	10 KΩ
μA	M	150 μA	15.150 V	100 K	NONE	---	0.1% RDG. + 1 DIGIT	1 KΩ
μA	H	1500 μA	15.150 V	10 K	NONE	---	0.1% RDG. + 1 DIGIT	100 Ω
mA	L	15 mA	15.150 V	1 K	R38	3-2 (A)	0.1% RDG. + 1 DIGIT	10.4Ω
mA	M	150 mA	15.210 V	100 Ω	R46	3-2 (A)	0.1% RDG. + 1 DIGIT	1.4 Ω

CAUTION: DO NOT APPLY MORE THAN 200 mA or DAMAGE TO THE INSTRUMENT MAY RESULT.
*A= ATTENUATOR ASSEMBLY

Figure 3-5. Current Calibration



NOTES

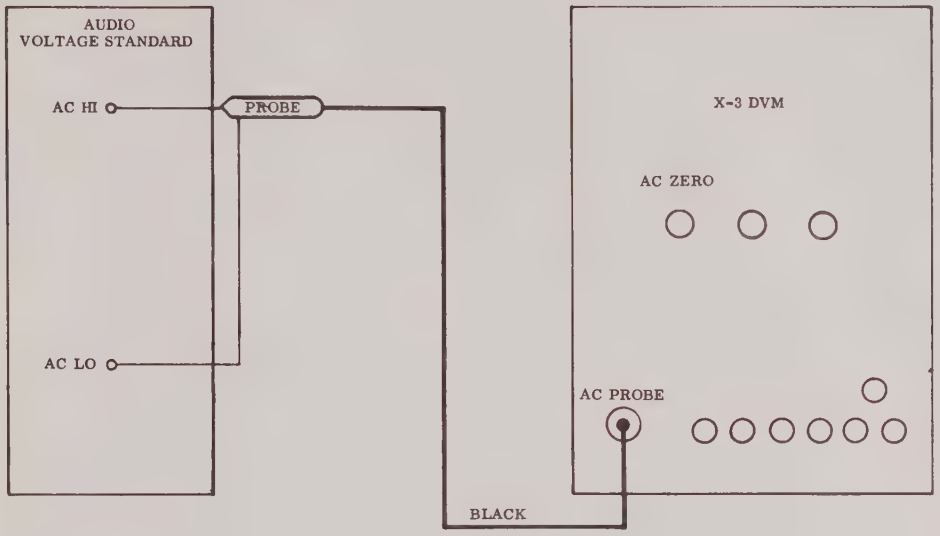
1. INSTRUMENT MUST BE FIRST CALIBRATED IN MVDC & DC MODES.
2. PRIOR TO EACH RANGE OR FUNCTION CHANGE, ZERO THE READOUT IN OHMS MODE (REFER TO CHAPTER II, ZEROING THE READOUT, Ohms Zero).

PROCEDURE

FUNCTION SWITCH POSITION	RANGE SWITCH POSITION	APPLY APPROXIMATELY	ADJUST	LOCATION* (Figure No.)	READOUT TO DISPLAY OHMIC VALUE APPLIED, WITHIN
Ω	H	1500 Ω	R22	3-1 (MB)	0.1% RDG + 1 DIGIT
Ω	M	150 Ω	NONE	---	0.1% RDG + 1 DIGIT
Ω	L	15 Ω	NONE	---	0.1% RDG + 2 DIGITS
KΩ	L	15 KΩ	NONE	---	0.1% RDG + 1 DIGIT
KΩ	M	150 KΩ	NONE	---	0.1% RDG + 1 DIGIT
KΩ	H	1500 KΩ	R10	3-2 (A)	0.5% RDG + 1 DIGIT
MEGΩ	L	15 MEGΩ	R11	3-2 (A)	1% RDG + 5 DIGITS
MEGΩ	M	150 MEGΩ	NONE	---	20% RDG + 5 DIGITS
MEGΩ	H	1500 MEGΩ	NONE	---	USEABLE FOR RELATIVE MEASUREMENTS

*MB = MAIN BOARD ASSEMBLY
A = ATTENUATOR ASSEMBLY

Figure 3-6. Ohms Calibration



NOTES

1. INSTRUMENT MUST FIRST BE CALIBRATED IN VDC MODE.
2. ZERO READOUT IN VDC MODE (REFER TO CHAPTER II, ZEROING THE READOUT, MVDC OR VDC Zero).
3. PRIOR TO EACH RANGE OR FUNCTION CHANGE, ZERO THE READOUT IN VAC MODE (REFER TO CHAPTER II, ZEROING THE READOUT, VAC Zero).

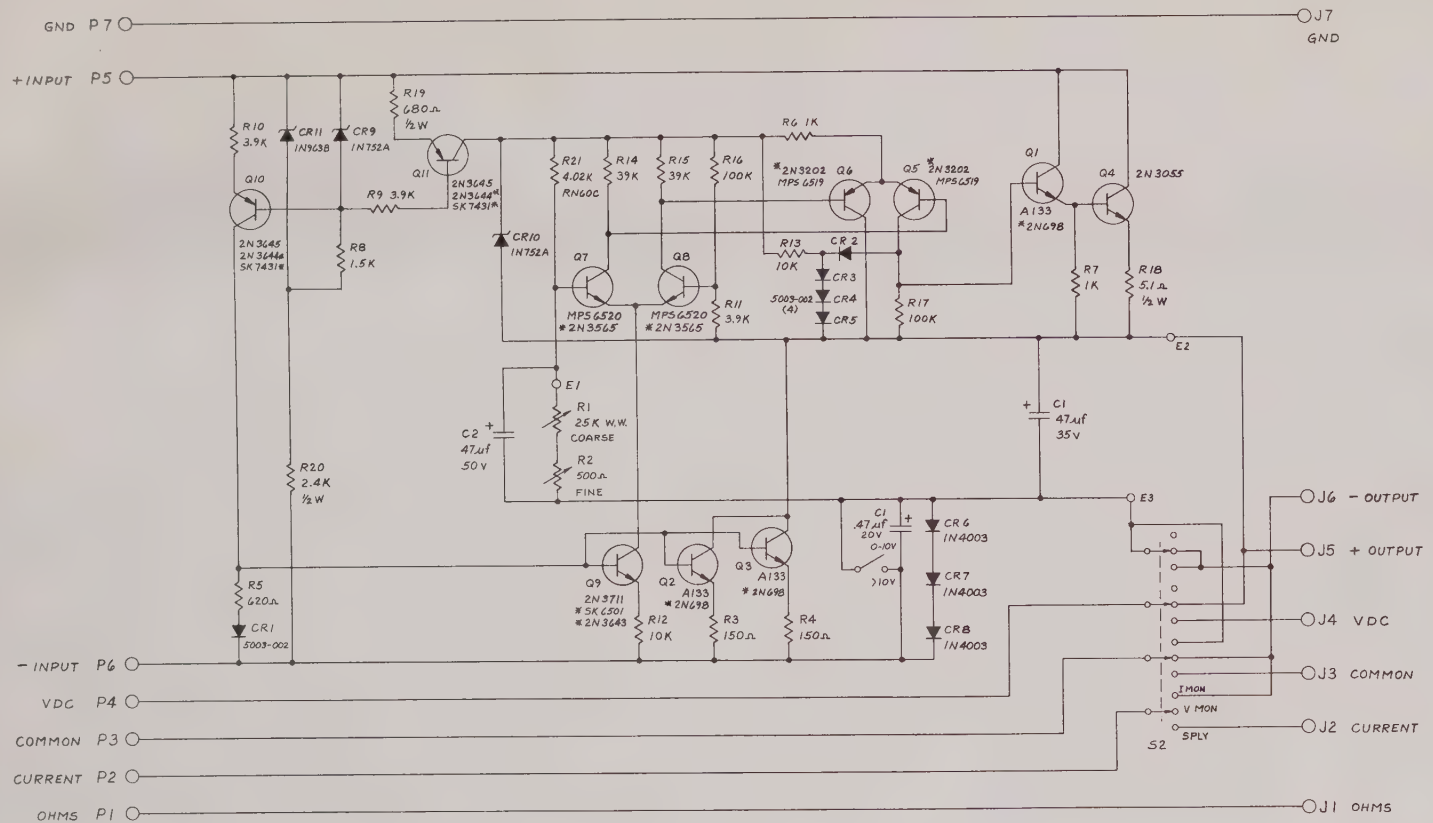
PROCEDURE

FUNCTION SWITCH POSITION	RANGE SWITCH POSITION	APPLY APPROXIMATELY	ADJUST	LOCATION*	READOUT TO DISPLAY VOLTAGE APPLIED, WITHIN
VAC	L	15 VAC, 400 Hz WARNING HIGH VOLTAGE	R33	3-2 (A)	3% F.S. (0.5V & UP)
VAC	M	150 VAC, 400 Hz	R35	3-2 (A)	3% F.S.
VAC	H	250 VAC, 400 Hz	R37	3-2 (A)	3% F.S.

CAUTION
DO NOT APPLY MORE THAN
300 VAC OR DAMAGE TO THE INSTRUMENT MAY RESULT

* A = Attenuator Assembly

Figure 3-7. VAC Calibration



2. * ALTERNATE.
1. RESISTORS R3-17 ARE ⅛W FIXED COMP.

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS					
ZONE	LTR.	EFFECT.	DESCRIPTION	DATE	APPROVED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MFR. CODE	CIRCUIT REF.	ITEM NO.

PARTS LIST

NEXT ASSY.	FINAL ASSY.	NEXT ASSY.	FINAL ASSY.
APPLICATION		QTY.	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ± .010
FRACTIONS ± 1/32
ANGLES ± 0° 30'
MATERIAL

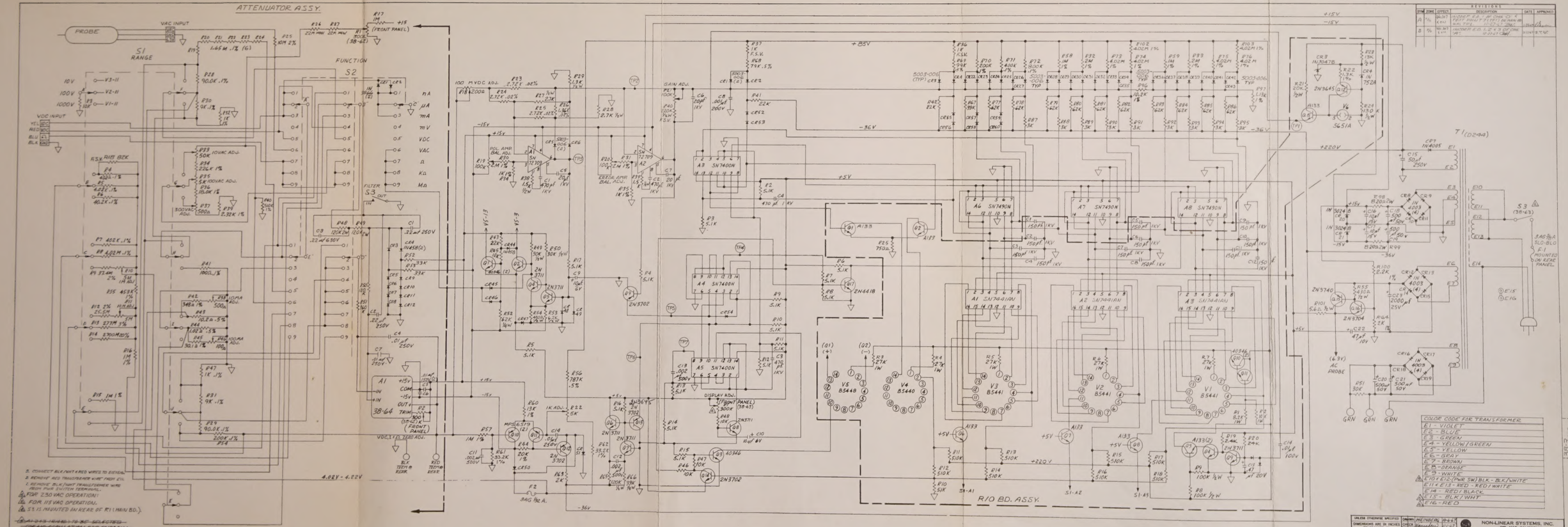
CONTR. NO.
DRAWN [illegible] 1-2-68
CHECK
APPR R Stevenson 1-28-68
RELEASE DATE 1-30-68

NON-LINEAR SYSTEMS, INC.
DEL MAR, CALIFORNIA

FINAL ASSY, POWER SUPPLY
SCHEMATIC
SERIES X-3, PS-1

SIZE	CODE IDENT NO.	
D	03626	38-80
SCALE	WEIGHT	SHEET 2 OF 2

38-80 SH 2



REVISIONS					
SYM	ZONE	EFFECT	DESCRIPTION	DATE	APPROVED
A	½	38-37 (-01)	CHANGE R1 FROM 2M TO 1M, C1 TO .22 MFD, TEST POINT TP (TP7) ON MAIN BD. ADD TP8	11-24-67	[illegible]
B	½	38-37 (-01)	ADD R69, E.O. 1, 2, 4, 5 OF ORIG. DWG.	11-24-67	[illegible]

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON: DECIMALS ± .005 FRACTIONS ± 1/16 SURFACE ROUGHNESS PER MIL-STD-13 DO NOT SCALE THIS DRAWING RELEASE DATE 11-24-67	DRAWN PH/NB/MG 10-6-67 CHECK [illegible] APPR [illegible] MFG APPR [illegible]
NON-LINEAR SYSTEMS, INC. DEL MAR, CALIFORNIA	
FINAL ASSY. DVM SCHEMATIC SERIES X3	
CODE IDENT NO. 03626	SIZE D
SCALE	WEIGHT
	SHEET
	38-3
	REV B

3-15-60

non linear
systems, inc.

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